evacuating the liquid PVA mixture for a period of time; then

transforming the liquid PVA mixture into a solid PVA hydrogel construct; and

freezing then thawing the solid PVA hydrogel construct during a plurality of freeze thaw cycles whereby the freeze thaw cycles promote an interlocking mesh or entanglement between molecules of PVA to provide a solid PVA hydrogel medical implant with mechanical strength without chemical crosslinking.

2. A method according to claim 1, wherein the freezing step is carried out by holding the solid PVA hydrogel construct in a frozen state for between about 4 to about 16 hours, including the freezing time.

3. A method according to claim 2, wherein the thawing step is carried by raising the temperature of the frozen solid construct to a desired temperature in between about 4 to about 16 hours.

4. A method according to claim 1, wherein the evacuating step comprises placing a mold holding the liquid PVA mixture in a vacuum chamber to remove air bubbles in the mixture.

5. A method according to claim 1, further comprising heating the liquid PVA mixture to promote at least one of solubilization or removal of air bubbles.

6. A method according to claim 1, further comprising heating the liquid PVA mixture to between about 95 degrees C. to about 120 degrees C. for at least 15 minutes before initiating a first freezing and thawing cycle.

7. A method according to claim 1, wherein, after the freezing and thawing cycles, the solid PVA hydrogel medical implant is flexible with a modulus of elasticity of between 0.1-20 MPa.

8. A method according to claim 1, wherein the solid PVA hydrogel medical implant has a degree of hydrolysis greater than 80%.

9. A method according to claim 1, wherein the liquid mixture consists essentially of a PVA polymer and between about 20% to about 95% water or saline, by weight.

10. A method according to claim 1, wherein the liquid mixture consists essentially of between about 2 to about 40 parts by weight PVA polymer with between about 98 to 60 parts by weight of water or saline.

11. A method according to claim 1, wherein the liquid mixture consists essentially of between about 10 to about 30 parts by weight PVA polymer with between about 90 to 70 parts by weight of water or saline.

12. A method according to claim 1, wherein the liquid mixture consists essentially of about 25 parts by weight PVA polymer with about 75 parts by weight of water or saline.

13. A method according to claim 4, further comprising allowing the liquid mixture room to expand in the mold as it becomes a solid hydrogel.

14. A method according to claim 1, wherein the solid PVA hydrogel medical implant comprises swelling properties whereby dimensions thereof increase by less than 20% when immersed in water.

15. A method according to claim 1, wherein the solid PVA hydrogel medical implant has swelling properties whereby dimensions thereof increases by less than 5% when immersed in water.

16. A method according to claim 1, wherein the solid PVA hydrogel medical implant has a Glass transition temperature that is greater than about 40 degrees Celsius.

17. A method according to claim 1, wherein the water or saline is isotonic saline of 0.9% weight to volume in water.

18. A method according to claim 1, wherein the water is sterile deionized ultrafiltered water.

19. A method of producing a solid polyvinyl alcohol medical implant, comprising:

providing an aqueous liquid mixture of water or saline and poly(vinyl) alcohol (PVA) polymer, the PVA polymer having an average molecular weight (MW) of between 124,000 to 186,000, wherein the liquid mixture has between about 20% to about 95% water or saline by weight;

evacuating the liquid PVA mixture for a period of time; then

transforming the liquid PVA mixture into a solid PVA hydrogel construct; and

freezing then thawing the solid PVA hydrogel implant during at least three freeze thaw cycles whereby the freeze thaw cycles promote an interlocking mesh or entanglement between molecules of PVA to provide a solid PVA hydrogel medical implant with mechanical strength without chemical crosslinking.

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